We claim:

1. A heterojunction comprising at least one carbon nanotube and at least one nanostructure connected, immobilized, attached, or affixed thereto.

2. The heterojunction of claim 1, wherein the carbon nanotube is a single walled carbon nanotube having a length of about 20 nm to about 2000 nm.

3. The heterojunction of claim 1, wherein the carbon nanotube is a multi-walled carbon nanotube having a length of about 40 nm to about 4000 nm.

4. The heterojunction of claim 1, wherein the nanostructure is a quantum dot or a quantum cluster comprising a plurality of quantum dots.

5. The heterojunction of claim 4, wherein the quantum dot is ZnS capped CdSe, CdSe, or $TiO_2$.

6. The heterojunction of claim 4, wherein the quantum dot comprises a CdSe core and a ZnS shell.

7. The heterojunction of claim 1, which comprises one carbon nanotube having one nanostructure connected, immobilized, attached, or affixed to one end of the carbon nanotube.

8. The heterojunction of claim 1, which comprises one carbon nanotube having two nanostructures connected, immobilized, attached, or affixed to each end of the carbon nanotube.

9. The heterojunction of claim 1, which comprises at least two carbon nanotubes having a nanostructures connected, immobilized, attached, or affixed to one end of each of the carbon nanotubes.

10. A method for making the heterojunction of claim 1, which comprises

oxidizing the ends of the carbon nanotube,

placing at least one amine group on the nanostructure, and

coupling at least one end of the carbon nanotube with the nanostructure.

11. The method of claim 10, wherein oxidizing the ends of the carbon nanotube comprises refluxing the carbon nanotube in an acid.

12. The method of claim 11, wherein the acid is nitric acid.

13. The method of claim 10, wherein the nanostructure has a ZnS shell or coating and placing at least one amine group on the nanostructure comprises reacting the nanostructure with 2-aminoethanethiolhydrochloride.

14. The method of claim 10, wherein coupling the end of the carbon nanotube with the nanostructure comprises adding 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide HCL in the presence of N-hydroxysuccinimide to form a sulfosuccinimidyl intermediate that is capable of forming an amide bond with the amine group on the nanostructure.

15. A nanodevice which comprises the heterojunction of claim 1.

16. The nanodevice of claim 15, and further comprising at least one nanostructure selected from the group consisting of photoactive molecules, photonic molecules, inorganic ions, inorganic molecules, magnetic ions, magnetic molecules, metallic ions, metallic molecules, metallic colloids, metal oxide molecules, polymers, aptamers, haptens, radioactive molecules, fluorophores, chromophores, chemiluminescent molecules, nanowires, nanofibers, quantum dots, nucleotides, nucleic acid molecules, polynucleotides, amino acids, peptides, polypeptides, proteins, and peptide nucleic acids.

17. The nanodevice of claim 15, wherein the nanodevice is a transistor, a light emitting diode, an inverter, a resistors, a capacitors, an interconnect, or a biosensor.